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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/547,561 04/12/00 MATHIEU

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EXAMINER

GILMAN, A

ART UNIT

PAPER NUMBER

2833

DATE MAILED: 02/28/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/547,561

Applicant(s)

MATHIEU ET AL.

Examiner

Alexander Gilman

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 12 April 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-82 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-82 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claim 23 is objected to because of the following informalities: " an interconnection element" should be replaced with " the interconnection element".

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.
2. Claims 4, 13, 48 and 76 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 in lines 11 and 12 recite " the first volume of the material ". It is unclear which one of the above-mentioned materials is claimed –first one (claim 1, line 2) or second one (claim 1, line 4).

Claim 13 recites the limitation "the activation layer" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claims 48 and 76, in lines 11 and 12 recite " a substrate ". It is unclear which one of the above-mentioned substrates is claimed –first one (line 2) or second one (line 8).

Claims 48 and 76, in lines 20 and 21 recite "a second contact node." It is unclear, if that element is component of "a plurality of second contact nodes", claimed in lines 8-9, or not.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. Claims 1-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al.

With regard to claims 1 - 3, Chen et al (US Pat. No. 6,150,186) disclose an interconnection element directly contacting a semiconductor device, the interconnection element comprising:

a first element material (204) adapted to be coupled to a substrate; and

a second element material (206) coupled to the first element material;

wherein upon transformation a shape of interconnection material is modified (Abstract, lines 10-14) .

With regard to claim 4, Chen et al disclose that the transformable property is such that a first volume is adapted to be transformed to a different second volume (col. 9, lines 55-59).

With regard to claims 5, Chen et al et al disclose that the second element material (206) overlies the first one (Fig 2b)

With regard to claim 6, Chen et al disclose that a transformation of the first and second material element is a result of exposing the second element to heat (col. 10, lines 34-36)

3. Claims 1- 6, 8-11, 14, 15, 18- 28, 30-32, 35, 38- 44, 48- 51, 55-59, 61-63, 66, 69- 79 are rejected under 35 U.S.C. 102(b) as being anticipated by Smith et al.

With regard to claims 1-3, 8, 22, 24, 30, 44, 48, 51, 55, 61, 75, 76, and 79, Smith et al (US Pat. 5,613,861) disclose (Fig. 6) a system comprising :

a first substrate (14) with a plurality of first contact nodes (13) formed on the first substrate and a plurality of free-standing resilient interconnection elements (15) electrically contacts a corresponding a corresponding the contact nodes;

a second substrate (101) having a plurality of second contact nodes (3),

wherein the interconnection element (15) comprises:

a first element material adapted to be coupled to a substrate, and

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a second element material adapted to be coupled to the first element material, (col. 4, lines 42-44); and one of the first element material and the second element material comprises a material having transformable property such that upon transformation, a shape of the interconnection element is irreversibly modified (col.5, lines 3-8),

wherein the interconnection element has a portion thereof which is capable to a first position to contact with one of second contact nodes.

With regard to claims 4, 25, and 56, Smith et al disclose that the transformable property is such that a first volume is adapted to be transformed to a different second volume.

With regard to claims 5, 27, and 58, Smith et al disclose that the second element material overlies the first (for example, considering the first element as a non-conductive element, according to col. 4, lines 42-43).

With regard to claims 6, 20, 28, 40, 59, and 71, Smith et al disclose that a transformation of the first and second material element is a result of exposing the first and/or second element to heat (col. 6, lines 36-39, specifically - the thermal evaporation).

With regard to claims 9, 11, 31, and 62, Smith et al disclose the second element is introduced by plating and more specifically electroless plating (col. 6, lines 36-39 and col. 8, lines 61-62).

With regard to claims 10, 32, and 63, Smith et al disclose the second element is introduced by sputtering (col. 6, lines 39-40).

With regard to claims 14, 15, 35, and 66, Smith et al disclose the second element comprises nickel or nickel alloy (col. 4, lines 44-46).

With regard to claims 18, 38, and 69, Smith et al disclose that transformable property is a stress and transformation reduces the magnitude of the stress of the material (col. 5, lines 19-21).

With regard to claims 19, 21, 39, 41, 70, and 72, Smith et al disclose that the second element material tensile and compressive stress and a deformation is a response to these stresses (col. 5, lines 11-21).

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With regard to claim 23, Smith et al (US Pat. 5,613,861) disclose a plurality of conductive signal lines associated with the substrate and the base of the interconnection element electrically contacts a corresponding one of the signal lines and (col. 4, lines 51-53).

With regard to claim 26 and 57, Smith et al disclose (Fig. 10-13) the free portion of the interconnection element material is initially fixed to the substrate (Fig. 11) and when the free portion is released from the substrate, the free portion is adapted to be biased away (col. 8, lines 43-45; Fig. 12).

With regard to claims 42, 43, 73, and 74 Smith et al disclose (Fig. 28).that the interconnection elements are coupled to more than one surface of the substrate and the first and the second contact points coupled through the re-distribution line and used as a part of a wafer-level test assembly.

With regard to claims 46, 49, 77, and 78, Smith et al disclose that the substrate comprises a component of a probe card (Fig. 29)

With regard to claim 50, Smith et al disclose the assembly is a part of a wafer-level test assembly (Fig. 26).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 7, 29, 34, 60, and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al.

Smith et al, respectively disclose all of the limitations except for:

transformation comprises at least 90 percent of transformable volume change of the second element material (claims 7, 29, 60);

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the spring material, coupled to the second element material, comprising at least about 90 percent of the interconnection element. (claim 34 and 65).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to discover the claimed quantitative characteristics of the transformability volume and percent of spring material in the interconnection element, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

3. Claims 12, 13, 33, and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al in view of Eldridge et al.

Smith et al disclose all of the limitations except for the first element material comprising palladium or its alloy.

Eldridge et al (US Pat. No. 5,832,601) disclose the first element material comprising palladium or its alloy (col. 14, lines 6-10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al interconnection element comprising palladium or its alloy, as taught by Eldridge et al, as an alternative material for the first element.

4. Claims 16, 17, 37, and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al in view of Faraci et al.

Smith et al disclose all of the limitations except for the second element material comprising a shape memory alloy

Faraci et al (US Pat. No. 5,810,609) disclose the second element material comprising a shape memory alloy (col. 14, lines 6-10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al interconnection element comprising a shape memory alloy, as taught by, Faraci et al, to improve the Smith et al interconnection element elastic qualities..

5. Claims 34, 36, 47, 52-54, 65, 67, and 80-82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al in view of Dozier II et al.

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With regard to claims 34 and 65, Smith et al disclose all of the limitations except for a spring material coupled to the second element material.

Dozier II et al (US Pat. NO. 5,772,451) disclose (Fig. 2A) a spring material coupled to the second element material (col. 15, lines 44-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al second element with the spring material coupled to the second element material, as taught by Dozier II et al, to improve the Smith et al interconnection element elastic qualities.

With regard to claim 36 and 67, Smith et al disclose (Fig. 13) a contact material (19) adjacent a surface of the spring material (col. 8, lines 61, 62).

With regard to claim 47, Smith et al disclose all of the limitations except for the substrate comprising a socket for releasably connecting the electronic assembly to an electronic component.

Dozier II et al (US Pat. NO. 5,772,451) disclose (Fig. 3) the substrate (310) comprising a socket for releasably connecting the electronic assembly to an electronic component.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al substrate comprising a socket for releasably connecting the electronic assembly to an electronic component, as taught by Dozier II et al, to utilize the interconnection elements for LGA-sockets.

With regard to claims 52 and 80, Dozier II et al disclose (Fig. 3) the second contact nodes (308) comprise external connection points.

With regard to claims 53, 54, 81, and 82, Dozier II et al disclose (Fig. 3):

the third substrate (302) and a plurality of third contact nodes (306) (claims 53 and 81);

a stop structure (336) disposed on the first substrate (claims 54 and 82).

6. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al in view of Khandros et al.

Smith et al disclose all of the limitations except for the substrate comprising an interposer.

Khandros et al (US Pat. NO. 5,994,152) disclose (col. 14, lines 24-34) the substrate comprising an interposer

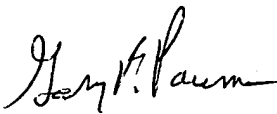
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Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al substrate comprising an interposer, as taught by Khandros et al, to utilize the interconnection elements for interposers.

Any inquiry concerning this communication should be directed to Alexander Gilman at telephone number 703 305 0847.

AG

2/23/01


GARY F. PAUMEN
PRIMARY EXAMINER